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RELATION OF INSECTS TO THE INJURY OF PONDEROSA PINE AT OROFINO, IDAHO

by
James C. Evenden
Senior Entomologist

INTRODUCTION

At the request of Mr. O. C. Frei, Portland Orofino Cement Company, an examination of the timber stands adjacent to Orofino, Idaho, was made on November 15 and 16. The purpose of this examination was to determine if insects were directly or indirectly responsible for the unhealthy condition of the ponderosa pine stands in this immediate area.

LOCATION AND DESCRIPTION OF AFFECTED AREA

Along the mountain on the north side of the river, adjacent to the city of Orofino, there is an area of ponderosa pine which from a distance can be seen to be in an abnormal condition. This area which can be seen from the highway as one approaches the air field, extends east from the point of the hill facing the State Institution for a distance of at least a mile up the north side of the Orofino Creek drainage. The width of the area varies considerably being perhaps a quarter of a mile at its widest part. Along this hillside the trees are in a decidedly decadent or unhealthy condition. Very few, if any, of the trees in this area carry a full complement of foliage and in most instances it is confined to tufts of needles at the ends of branches. Some trees carry two or three years of foliage, while others have only the 1945 growth. In some instances the new needles are normal in length and density but on the more severely injured trees it is short and sparse in appearance.

In this general area of unhealthy trees, there are two portions where the injury is extremely severe. One of these is near the west end of

the unit and comprises some three to five acres which faces to the southwest. The other area is larger, involving some 15 to 18 acres, and is near the east end of the unit, immediately north and slightly to the east of the Cement Plant. As one views these two areas from adjacent highways, the difference in the severity of the injury and the boundaries of the acres of severe damage are easily observed. In these portions of the general area, many small trees, from 3 to 6 inches in diameter, have died during the past year and it is believed that many larger ones will succumb during the coming season. On most trees the lower limbs are dead with the most healthy appearing foliage being confined to the extreme top of the trees. On the lower limbs, the tufts of green foliage are green in name only as in most instances the needles are badly withered and often quite lifeless.

FOREST INSECTS RECORDED WITHIN AREA OF UNHEALTHY TREES

Western Pine Beetle, (Dendroctonus brevicomis)

Within the area under consideration, a number of the larger ponderosa pine trees have been attacked by the western pine beetle, and now harbor over-wintering broods of this insect. The western pine beetle is considered as the most important insect enemy of ponderosa pine throughout the states of California, Oregon, Washington, Idaho, and Montana. Under normal conditions it breeds in over-mature trees, in windfalls, in unhealthy trees, or trees weakened by various causes. However, during epidemic outbreaks, it becomes aggressive in character and attacks and kills vigorous trees of all ages, providing the bark is of sufficient thickness to permit its development. Small trees of 6" in diameter or limbs of large trees are seldom attacked.

In this area of unhealthy trees, the attacks of this beetle are considered as being secondary in character, as it is quite obvious that the trees were in an unhealthy condition and susceptible to bark-beetle attack at the time they were infested. It is true that these bark beetle attacks no doubt hastened the death of the trees by a year or more. It is also quite possible that a rather serious outbreak of this beetle may develop within these weakened trees which could spread to more healthy timber stands adjacent. However, in connection with this problem, the western pine beetle is in no way responsible for the decadent condition of the ponderosa pine trees throughout the area in question.

Red Turpentine Beetle, (Dendroctonus valens)

A few old attacks of the red turpentine beetle were found at the base of some of the larger trees. The number of these attacks is not abnormal and is in no way responsible for the existing condition of the trees within the area.

Sequoia Pitch Moth, (Vespamima sequoia)

Attacks of this insect, as evidenced by large masses of pitch, were recorded on the bole of a number of trees within the general area. This insect is not considered as a serious enemy of forest trees and has not contributed to the general unhealthy condition of ponderosa pine trees throughout the area.

Birdseye Pine Midge (Retinodiplosis sp.)

On a few trees, there is a flagging (killing of limb tips) which is similar to the work of the birdseye pine midge. This was especially noticeable around the edges of the general area of damage on trees which had a full complement of normal foliage. However, an examination of both dead and green twigs from these trees failed to show the presence of this insect.

Scale Insects (Species undetermined)

A scale infestation is present on the foliage of ponderosa pine throughout an area which extends for at least two miles north, east, and west of Orofino. Outside of and some distance away from the area of unhealthy trees, the infestation is not heavy but can be found on the foliage of practically all trees. However, within the area of unhealthy trees the infestation is extremely heavy, with the foliage being literally covered with over-wintering scales. This is the only epidemic scale infestation on an area of forest trees of which we have record. Most scale infestations on forest trees which are at all severe, are confined to a few isolated trees growing under extremely adverse conditions.

It is obvious that a scale infestation of this severity could be responsible for the foliage injury observed. However, this does not imply that the scale infestation constitutes the primary injury. This doubt is based upon the fact that scales are present in a normal infestation on trees remote from the areas of severe injury, and that there may be a direct reason for the epidemic scale population within the area under consideration.

Spider Mites (Species undetermined)

On some of the material examined, there was a fairly heavy infestation of spider mites. Although these insects undoubtedly have contributed to the decadent condition of the foliage, they are considered as being of minor importance. This position is taken by the fact that we have records of extremely severe outbreaks of spider mites on forest trees which subsided in a year or two with no permanent injury to any of the trees infested.

Other Insects (Species undetermined)

On the twigs where the foliage is heavily infested with scales, there are numerous black eggs about .6 of a millimeter in length. The identity of these eggs is not known but are believed to be of a dipterus parasite, as they were not present on material uninfested by the scale. A few dead aphids were also recorded, many of which were parasitized. There was also evidence of feeding by other insects, which is a condition not uncommon on all ponderosa pine trees. Under normal conditions, such attacks are not considered as important.

PHYSICAL CONDITION OF THE TREES WITHIN THE EFFECTED AREA

The timber in this area is an uneven-age ponderosa pine stand with very few trees of other species. The age of this timber varies from small reproduction to trees of 200 or more years. It is not known how long this unhealthy condition of the trees has been in evidence, but the past growth rate indicates that it is of a rather short duration. Increment cores taken from trees within the two seriously injured portions of the effected area show that good diameter growth was made prior to 1944. This growth averages for trees of all sizes and ages approximately 1/5 of an inch of diameter per year. The growth of the smaller and younger trees, which in many instances are the most severely injured, has been more rapid, requiring only 3 to 4 years to produce an inch of diameter growth. This satisfactory rate of growth indicates that the existing condition of the trees does not arise from an impoverishment of the soil or from a lack of moisture.

In this unhealthy timber stand, as well as in an area of apparently healthy trees, one and one-half miles east of the cement plant on Orofino Creek, all trees show a reduction of growth during the years 1944 and 1945. These data were obtained by comparing the growth of these two years with the average annual increment during the five year period from 1939 to 1943 inclusive. In the two seriously injured portions of the effected area, this reduction in growth was 51 and 48 percent for 1944, and 71 and 72 percent for 1945. Cores taken from other portions of the effected area, but apart from the seriously injured portions, show a reduction of 18 percent for 1944 and 54 percent for 1945. In the area east of the cement plant on Orofino Creek, the reduction in growth was 24 percent for 1944 and 19 percent in 1945. This condition within an area of uninjured trees indicates the possibility of a normal growth reduction for the years 1944 and 1945. Although this may have occurred, such conditions are usually associated with reduced rainfall, and the precipitation for the first 9 months of 1945 within the Orofino territory has been above normal. Regardless of the possibility of such an occurrence, it is obvious that there is a much greater reduction of growth within the area of unhealthy trees than where there is no visible injury.

During early September, Mr. A. L. Gibson of the Coeur d'Alene Laboratory at Coeur d'Alene, Idaho, made a casual examination of the injured trees

on the east end of the effected area. Mr. Gibson states that at the time of his examination the trees on the hill in the vicinity of the cement plant had a greyish appearance due to a heavy accumulation of dust on the twigs and foliage. He states that this dust occurred in such quantities that jarring of the limbs caused small dust clouds. At the time of my examination on November 15 and 16, this dust was not in evidence, due perhaps to severe rains which had and were still occurring. However, in the heavier tufts of foliage occurring at the ends of limbs on the lower portions of some trees, the foliage was quite dirty with almost a muddy condition at the base of the needles along the twigs. This condition is quite abnormal for ponderosa pine trees.

SUMMARY

It is unfortunate that this is not a problem where a simple yes or no answer can be given as to the role which insects are playing in the unhealthy condition of the trees in question. It can be assumed that the scale infestation is of sufficient severity to cause the described decadent condition of the foliage which is subsequently reflected in the health or vigor of the trees. As stated, we have no records of previous scale epidemics of this character, and it is rather unlikely that many such outbreaks would have escaped being reported during the past 30 years. Although it cannot be said that these insects will not develop to epidemic populations under normal forest conditions, our present knowledge of this insect leads us to look for the presence of some environmental factor or factors which could have contributed to the building of the outbreak.

Normal healthy forest trees are resistant to the attacks of injurious forest insects. Although on all forest trees one can find such insects as scales, aphids, leaf feeding caterpillars, and beetles, etc., the resistance of the trees to these normal attacks is sufficient to withstand any injury which may occur. Furthermore, normal healthy trees do not provide favorable conditions for the development of destructive populations of injurious insects. However, trees weakened from different sources of injury, lose their resistance to insect attack and provide favorable breeding places for the development of epidemic forest populations.

It is possible that the dust on the trees as recorded by Mr. Gibson in early September is responsible for the primary injury to the trees and which in turn has made them susceptible to insect attack. In offering this possibility, it is also recognized that heavy accumulations of dust may possibly inhibit insect life as well as adversely effecting plant life. A great deal of work has been done in connection with the effects of smoke and dust upon various forms of plant life, their relation to insect life is not clearly understood. The effects of smoke from manufacturing cities, smelters, pulp mills, coke ovens, etc., upon all kinds of plant life is very evident.

The solution of this problem is complicated by factors which will require additional study to determine their importance. Such studies, which may

be of rather long duration, would undoubtedly reveal further information and may provide a clearer picture of the situation than is available at this time. As stated, I regret I am unable to give positive answers to all phases of this problem. However, in connection with the role which insects are playing in the injury to trees within this area, it is my belief that their attacks are secondary, and that some other agency is responsible for the primary injury.